RAINY DAY FUNDS

Analysis and Recommendations for Tennessee

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Introduction

This report investigates the goal that Tennessee should set for its rainy day fund. The rainy day fund should be regarded as one facet of a sound financial policy for Tennessee and does not supplant other key factors such as good tax policy, frugal but apt spending, sound use of debt, and so forth. The analysis provided here is based on the presumption that the rainy day fund is intended to allow Tennessee to maintain necessary spending patterns during tight economic periods without making significant changes in revenue policy, such as raising tax rates. Tennessee has traditionally reduced expenditure growth (though not nominal expenditures) during recessions but not as much as revenues have slowed, meaning the need for a rainy day fund is apparent in actual behavior. Creation of a rainy day fund recognizes that the timing of when revenues flow into a state may not perfectly coincide with the timing of when expenditures should be made. Thus, balances should be built during robust revenue growth periods for use as necessary during times of unusually weak revenue performance or unusually high expenditure demands. Creation of a significant rainy day balance also imposes fiscal discipline upon the state as long as the revenues are used only for the intended purposes.

The report is composed of four sections following this introduction. The first examines the rating agencies' views about rainy day funds and the role that a state's rainy day fund plays when specific ratings are determined. The second summarizes the academic literature on how to evaluate rainy day funds and their appropriate size. The third contains simulations on the rainy day fund that would be necessary for Tennessee to withstand various degrees of economic storms. The final section is a brief conclusion.

Section 1: Rating Agency Recommendations

OVERVIEW OF STANDARD AND POOR'S RATING CRITERIA

In June 2006, Standard & Poor's (S&P) introduced the Financial Management Assessment (FMA) criteria, an analytical methodology that evaluates ongoing management practices and policies in seven areas most likely to affect credit quality.[1] According to S&P, while the FMA score is just one element of a credit review, the criteria serve as an enhancement to its public finance general obligation credit analysis. The primary purpose of the FMA is to provide better transparency to aspects of the analysis of a government's practices that have always existed, provide better communication and disclosure of the environment in which financial decisions are made, and highlight in a consistent manner the most transparent aspects of management that are common to most governments. A government's reserve policies is one of seven areas S&P evaluates before assigning the overall FMA score of strong, good, standard, or vulnerable.

The seven areas in the FMA are:

- Revenue and expenditure assumptions
- Budget amendments and updates
- Long-term financial planning
- Long-term capital planning
- Investment management policies
- Debt management policies
- Reserve and liquidity policies

The evaluation of each area focuses on best practices rather than policies that may be unique to specific governments. In determining the overall assessment, the revenue and expenditure assumptions and budget amendments and updates are given the highest level of importance. The reserve and liquidity policies and long term financial planning are given average importance. Capital planning, investment management and debt management policies receive the least weight.

OVERVIEW OF MOODY'S AND FITCH RATINGS CRITERIA[2]

Both Moody's and Fitch Ratings (Fitch) use the following four broad categories to support their rating assignment:

- Economic factors
- Debt factors
- Financial factors
- Management and administrative factors.

A factor may become more important during the assessment if it represents a particular strength or weakness or if it is more likely to have a significant impact on credit quality in the near term. Moody's focus is on planning and control and the government's policies regarding spending, use

[1] James Wiemken. *Public Finance Criteria: Financial Management Assessment*. Standard & Poor's, June 27, 2006. These criteria replaced the criteria published in the 2005 Public Finance Criteria.

[2] "The Determinants of Credit Quality," Moody's Rating Methodology Handbook, November 2000. The FitchRatings criteria were taken from a presentation, "State and Local Finances After the Storm: A Rating Agency's View," by FitchRatings Directors, Melanie Shaker and Laura Porter, at the Urban Institute, March 30, 2007.

of surplus, and shortfall contingency plans. Moody's states that sustainable fiscal management strategies along with a carefully managed reserve level can help elevate a rating.

In 2006 Moody's introduced the U.S. State Credit Scorecard which provides a quantitative score and a clear relative ranking of each state on the broad evaluation variable. For 2006, Tennessee was ranked in the top quintile on debt factors, in the middle quintile on financial and management factors, and in the bottom quintile on economic factors.

THE BOND RATING COMPANIES' EVALUATION OF RESERVES

Policy decisions made by budget officials directly affect a government's financial position, and their ability to implement sound financial decisions in response to unplanned economic and fiscal demands is a primary determinant of near-term changes in credit quality. S&P takes the position that there is no single recommended fund balance level for all governments and that the appropriate level depends on cash flow patterns, revenue concentration, and other unique operating risks or lack of risks. In evaluating the reserve and liquidity policies of the government, S&P examines whether the government has established a formal operating reserve policy that takes into account the government's cash flow and operating requirements and the historic volatility of revenues and expenditures. Three different ratings are used when evaluating the reserve and liquidity policies: strong, standard, or vulnerable.[3]

Rating	S&P Description of Reserve and Liquidity Policies
Strong	A formal operating reserve policy is well defined. Reserve levels are clearly linked to the government's cash flow needs and the historic volatility of revenues and expenditures throughout the economic cycles. Management has historically adhered to it.
Standard	A less defined policy exists, which has no actual basis but management has historically adhered to it.
Vulnerable	Absence of basic policies, or if they exist, they are not followed.

A key financial statistic for Moody's is the general fund balance as a percent of revenues. This ratio provides a measure of the financial reserves potentially available to fund unforeseen contingencies and, therefore, should be related to the likelihood that such reserves will be needed. Specifically, Moody's likes to see the general fund balance between 5-10 percent of annual revenues, but the balance will vary depending on the government and its unique operating environment. They focus on expected financial trends and anticipated fiscal flexibility and therefore do not state a specific level of reserves. Reserve levels may cause a change in rating if there is significant growth or decline in the reserves and there is an expectation that the trend will continue. Furthermore, the implementation of a new strategy that is expected to help or hurt a state's financial flexibility (yet maintain reserve levels) could also cause a change in rating.

[3] These same ratings are used when assigning an overall FMA rating. In addition, S&P uses a rating of 'good' to further differentiate governments with a mix of strong and standard practices. An overall rating of 'good' indicates that practices a deemed currently good, but not comprehensive. The practices may not be formalized, may lack detail, or may have little recognition by decision makers outside the finance department.

Fitch states that having an operating reserve or rainy day fund may be the most effective practice a government can use to enhance its credit rating.[4] However, the size of the reserve depends on the variability of revenues and expenses.

The policies behind the reserves are equally important to the level, liquidity, and availability of reserve funds.[5] Fitch gives the highest credit rating to governments that institutionalize reserve policies and adhere to those policies during periods of economic stress and changes in leadership. The best reserve policies meet one or more of the following criteria:

- establish a target level (i.e., reserve floor) as a percentage of expenditures
- specify appropriate circumstances for drawing down reserves
- direct the replenishment of reserves

The target should provide financial flexibility for the long run and short run but also be realistic and sustainable. Fitch suggests that an *unreserved* fund balance of 5 percent of expenditures is considered "sound" but that balances of 10 percent or more are viewed more favorably.[6,7] They also state that entities with higher degrees of overall credit risk, tax base concentration, and volatile economies may require higher reserves.

Spending down reserves should not hurt a state's bond rating. According to S&P, "use of reserves is not a credit weakness in and of itself. These reserves are accumulated in order to be spent during times of budgetary imbalance and extraordinary economic events."[8] Similarly, Moody's states that spending a prior surplus "may not signify fiscal problems," particularly if the draw-down is used for a one-time capital project. Fitch also recognizes that budgeted draw downs are necessary and inevitable, but they view written policies regarding reserve drawdowns and replenishment very favorably. Seven of 10 states with an AAA bond rating as of March 2007 used one-third or more of their rainy day fund in 2002; Minnesota, North Carolina, and South Carolina used their entire rainy day fund in 2002.[9]

Conversely, Moody's states that a large budget surplus may have a *negative* effect if it results from a government's failure to execute planned spending programs or results in legislative action that limits future taxation.[10] Such limits could affect a government's financial and operating flexibility – factors that Moody's lists as key factors that drive ratings changes.[11]

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[4] Jason Dickerson and David Litvack. *The 12 Habits of Highly Successful Finance Officers.* FitchRatings, November 21, 2002.
[5] Jessalynn Moro and Amy Laskey. *The Bottom Line: Local General Government Reserves and the Policies that Shape Them.* FitchRatings, January 26, 2005.
[6] Amy Laskey and Amy Doppelt. *Local Government General Obligation Rating Guidelines*. FitchRatings, March 22, 2007.
[7] Fitch uses the terms "fund balance," "reserves," "stabilization funds," and "rainy day funds" to analyze financial cushion.
[8] Robin Prunty, Alexander M. Fraser, Steven J. Murphy. *Commentary: The State of the States*. Standard & Poor's, October 18, 2001.
[9] Robin Prunty, Alexander M. Fraser. *U.S. State Ratings and Outlooks: Current List*. Standard & Poor's, January 29, 2003.
[10] Moody's Rating Methodology Handbook, Public Finance, 2000, p. 99.
[11] Moody's p. 103.

Tennessee

S&P evaluates Tennessee's financial management practices as strong and stable.[12] S&P states that reserves are in-line with its forecast expectations. Tennessee has posted operating surpluses and additions to the reserves since 2003 with a rainy day operating reserve fund balance of $275 million at the end of fiscal year 2005. Budgeted reserves of $497 million are estimated for fiscal year-end 2007, meeting management's targeted minimum requirements of 5 percent of state tax revenues.

FitchRatings last updated its ratings for the State of Tennessee on October 27, 2006.[13] Tennessee's general obligation bond rating was upgraded to 'AA+' from 'AA.' Fitch cited Tennessee's low overall debt level, healthy reserves, and historically conservative financial management as positives. Fitch cited the State's large dependence on sales tax revenues as a significant risk factor.

Comparison with Other States (Refer to Table 1)

As of March 2007, 16 states including Tennessee have scored 'strong' on the FMA evaluation, 33 states have scored 'good', and 1 state scored 'standard'. No state received a vulnerable rating. Seven of 9 states with an AAA bond rating received a 'strong' FMA rating (Delaware, Florida, Maryland, Minnesota, North Carolina, Vermont, and Virginia). Several states impose legal reserve minimums and maximums and also require replenishment of withdrawals from their rainy day funds. In general, reserves for highly rated states are required by the state's constitution or by statute, and minimums are stated as a percentage of general fund revenues. A typical reserve target for 'strong' rated states is 5 percent, but several have higher targets, including Missouri (7.5 percent), Georgia (10 percent) and Utah (6 percent).

IMPLICATIONS AND CONCLUSIONS FOR TENNESSEE

The three bond rating agencies above all state that reserve policies are important criteria when assigning a bond rating, though the agencies may place different weights on reserves in their overall assessment. Reserve policies should be clearly stated and reserves should provide financial flexibility and be properly managed. None of the agencies, however, recommend a specific level of desired reserves, preferring to evaluate the reserve levels as one part of the overall financial picture. States that have a S&P FMA overall rating of 'Strong' and a AAA bond rating tend to have reserves of 5 percent of revenues or higher. Moody's prefers reserve levels to be between 5 percent and 10 percent of annual revenues and Fitch prefers levels to be between 5 percent and 10 percent of annual expenditures, but both rating agencies state that the appropriate level depends on the State's operating environment.

Tennessee's heavy reliance on the sales tax and lack of a broad-based personal income tax are cited by the ratings agencies as financial risks due to the lack of a diversified tax stream. In addition, we expect the traditional sales tax base to continue to fall, primarily due to two reasons. First, there has been a shift in consumption toward non-taxable services and away from taxable goods. Second, the growth in e-commerce continues to be an issue because remote sellers without physical presence are not required to collect the use tax

[12] Theodore Chapman, *State Review: Tennessee.* Standard & Poor's, October 20, 2006.
[13] Kyle Gephart and Richard Raphael. *State of Tennessee*. FitchRatings, October 27, 2006.

The inherent structural deficiency is somewhat offset by Tennessee's stable and relatively broad sales tax base. However, the non-diversified tax stream suggests that a higher cushion than most states is necessary to protect against shortfalls due to general economic conditions, or a further deterioration in the sales tax base that cannot, in Tennessee, be offset by growth in the income tax base. Based on the analysis of the three bond rating agencies, the State should maintain its reserve levels at a minimum level of 5 percent, but target reserves at the upper end of the strongest rated states and the upper end of Moody's and Fitch's suggested range – 7.5 percent to 10 percent.

TABLE 1

Summary of State Rainy Day Funds and FMA and Bond Ratings

State	Description of Reserve Levels	Created Under	FMA Overall Rating	S&P Bond Rating
Alabama	None for the general fund, but reserve is set for the education trust fund		Good	AA/Stable
Alaska	Budget reserve for settlements from tax and royalty disputes between the state and oil and gas producers; no minimum balance but funds usually appropriated for budget shortfalls.	Constitution	Good	AA/Stable
Arizona	Yes, with a maximum limit of 7 percent of general fund revenue		Good	AA/Stable
Arkansas			Good	AA/Stable
California	Recently enacted fund; deposits are at the annual discretion of the governor.		Standard	A+/Stable
Colorado	Reserves are required to be at least 4 percent of budgetary expenditures.		Good	AA-/Stable
Connecticut	Budgetary reserve fund with a ceiling of 10 percent and can only be drawn to fund operating deficits.	Statute	Strong	AA/Stable
Delaware	Reserve funded at 5 percent of budgetary general funds revenue; fully funded since 1980.	Constitution	Strong	AAA/Stable
Florida	Stabilization fund equal to 5 percent of the net general revenue fund collections form the prior fiscal year; The combined general and stabilization fund balances grew to $4.6 billion or 18.3 percent of revenues a end of FY 2006.	Constitution	Strong	AAA/Stable
Georgia	Reserve cannot exceed 10 percent of the net revenues of the preceding fiscal year; Governor may release for appropriation any excess of more than 4 percent of net revenues.	Statute	Good	AAA/Stable
Hawaii	Emergency budget reserve but no target for the size.	Legislature	Good	AA/Positive
Idaho			Good	AA-/Stable
Illinois	Fund must be repaid by the end of the fiscal year; statute also provides for an increase but has not been triggered since 2004.	Statute in 2001		
Indiana			Good	AA+/Stable
Iowa	2 rainy day funds: (1) cash reserve fund – target is 7.5 percent of adjusted general fund revenues for the current year (2) economic emergency fund – target is 2.5 percent.	Statute	Good	AA+/Stable
Kansas	Reserve targets 7.5 percent of expenditures but legislature has lowered it to 5 percent for the past 5 years.		Good	AA+/Stable
Kentucky	Reserve targets 5 percent of general fund revenues.	Statute	Good	AA-/Positive
Louisiana	Reserve legal maximum of 4 percent of revenue receipts of the prior year; withdrawals are limited to 1/3 of the balance.	Constitution	Good	A/Stable

Maine	Reserve limited to 12 percent of total general fund revenues in the preceding fiscal year; cannot be reduced below 1 percent of total revenue in the preceding fiscal year.	Statute	Good	AA-/Stable
Maryland	Fund maintained at general legal maximum of 5 percent; current law allows it to be increased to 7.5 percent.	Statute	Strong	AAA/Stable
Massachusetts	Statute requires 100 percent of consolidated net surplus be deposited; Beginning 2004, .5 percent of the current net tax revenues must deposited; Fund maximum cannot exceed 15 percent of the current year's revenues – excess must be used for tax reduction.	Statute	Strong	AA/Stable
Michigan	Any inflation-adjusted growth in personal income above 2 percent should trigger a proportionate transfer of general fund/purpose revenues into the fund; However, in recent years, the legislature has passed temporary exemptions to the income-based transfer and year-end fund balance transfers have been used in the next year's budget. No minimums exist.	Statute	Good	AA/Negative
Minnesota	Formal reserve policies for budgetary reserves are in place.		Strong	AAA/Stable
Mississippi	Formal reserve policies identify specific dollar amounts for budgetary reserves.		Strong	AA/Stable
Missouri	Required to maintain reserves of 7.5 percent of the prior year's general revenue collections.	Constitution	Good	AAA/Stable
Montana	No formal policy for reserves.		Good	AA-/Stable
Nebraska	Formal multi-year projections include strong reserves.		Good	AA+/Stable
Nevada	General fund reserves between 5-10 percent with excess transferred to rainy day fund. Controller deposits 40 percent of the unrestricted general fund balance into the stabilization fund if it is available. The available portion is 5 percent or more of the general fund appropriations.	Statute	Strong	AA+/Stable
New Hampshire	Rainy day fund is based on year-end surpluses; maximum equal to 10 percent of general fund unrestricted revenue; can only be used to meet undesignated general fund deficits or specific appropriations.	Statute	Good	AA/Stable
New Jersey	Rainy day fund with no minimum or replenishment requirements; certain conditions for using funds.	Statute	Good	AA/Stable
New Mexico	Management has identified minimum reserves equal to 5 percent of appropriations and targets reserves at 10 percent of appropriations within the general fund.	None	Good	AA+/Stable
New York	2 types: (1) Stabilization reserve funded at 2 percent of general fund disbursements (2) New general fund rainy day reserve funded at 3 percent of general fund disbursements. When combined and fully funded, 2 reserves which comprise 5 percent of general fund expenditures; can be used for midyear shortfalls, catastrophic events, economic downturns.	Statute	Strong	AA/Stable

North Carolina	Formal reserve policies. (1) Savings reserve account replenished to 8 percent, with 25 percent of unexpended appropriations plus over collections of revenues beyond the certified target going into it annually. (2) Repair and renovation reserve funded to 3 percent of the replacement cost of state buildings. (3) Two other discretionary reserves maintained.		Strong	AAA/Stable
North Dakota	Budget stabilization fund is equal to 5 percent of the next biennium's general fund budget; there is not formal fund balance requirement.		Good	AA/Stable
Ohio	Budget stabilization fund target is 5 percent of the general revenue fund revenue for the preceding fiscal year.		Strong	AA+/Stable
Oklahoma	At the beginning of each fiscal year, collections that exceed the estimate for the previous year are deposited into the rainy day fund until the balance equals the constitutional limit of 10 percent of the previous year's certified general fund appropriations; no minimum policy.	Constitution	Good	AA/Stable
Oregon	Lacks a general fund reserve but approved an education stability fund to be funded with lottery proceeds.	Legislature	Strong	AA-/Stable
Pennsylvania	Budget stabilization fund that reserves 25 percent of year year's surplus until it reaches 6 percent.	Statute	Good	AA/Stable
Rhode Island	Rainy day fund maintained at legal maximum of 3 percent of revenues; can be increased over time to 5 percent with a voter-approved constitutional amendment.	Statute	Strong	AA/Stable
South Carolina	General reserve funded at 3 percent of general fund revenue for the latest completed fiscal year; can be used for operating deficits but must be replenished within 3 fiscal years.		Good	AA+/Stable
South Dakota	2 rainy day funds: (1) budget reserve fund and (2) property tax replacement fund.	Statute	Good	AA/Stable
Tennessee	Minimum reserve requires at least 10 percent of state tax revenue growth until a reserve of 5 percent of the education and general funds is reached.	Statute	Strong	AA+/Stable
Texas	Stabilization fund funded with 75 percent of the amount by which oil and gas tax collections in any year exceed 1987 collections and half of any unencumbered general revenue surplus at the end of each biennium; Fund capped at 10 percent of general revenue income during the previous biennium; No required balance.	Constitution (amended in 1988)	Good	AA/Stable
Utah	Rainy day fund of 6 percent on a combined basis between its general and uniform school funds (i.e., state's operating funds).		Good	AAA/Stable
Vermont	Maintains a stabilization fund and in 1993 created a separate budget stabilization reserve within the general and transportation funds. All reserves cannot exceed 5 percent of previous year appropriations. An education reserve, created in 1999, with reserves at 3.5 percent-5 percent of expenditures.		Strong	AA+/Stable
Virginia	Revenue stabilization fund based on a formula tied to	Constitution	Strong	AAA/Stable

	revenue performance.			
Washington	None		Good	AA/Positive
West Virginia	Rainy day fund funded from 50 percent of each year's operating surplus, up to 10 percent of the general revenue appropriations for that year.		Good	AA-/Stable
Wisconsin			Good	AA-/Stable
Wyoming	Budget reserve account that sets aside 5 percent of general fund resources. $270 million at FYE 2006; goal is $1 billion.	Legislature	Good	AA/Stable

Source: Robin Prunty, U.S. State Financial Assessment Scores Mirror the Sector's Above-Average Credit Strength, Standard & Poor's, March 8, 2007.

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Section 2: Academic Recommendations

WHY STATES SHOULD EXPECT TO HAVE DIFFERENT RAINY DAY FUNDS

A number of academic studies have been undertaken on how to determine the appropriate size of a rainy day fund. Several authors indicate that states should expect to have different rainy day funds. Cornia and Nelson (2003), argue that a "one-size-fits-all" rainy day fund may not be appropriate because current economic conditions influence state revenue sources and expenditures differently.[14] The states differ dramatically on the relative importance of state revenue sources including sales, income, corporate franchise, severance, as well as other types of taxes and fees, and the relative mixture of the states' expenditure patterns for purposes such as welfare, education, health care, Medicaid, and unemployment insurance. The appropriate rainy day fund differs because the business cycle exerts varying influences on the growth and stability of these specific categories of revenues and expenditures. Further, Joyce (2001) believes the more volatile a state's budget environment, the larger the required rainy day fund.[15]

APPROACHES TO DETERMINING AN APPROPRIATE RAINY DAY FUND

Sjoquist (1998) used simulation analysis to determine the optimal rainy day fund for Georgia based on different potential goals that the state may have adopted for the 1990-92 time period.[16] Possible goals include: maintaining the historic expenditure growth rate across the entire time period, maintaining the historic average annual growth rate, and avoiding any cut in expenditures due to the recession. Sjoquist developed scenarios for the appropriate rainy day fund balance using each of these goals and the results are discussed below.

Joyce (2001) categorized states using a volatility index based on five factors that are expected to influence the optimal size of rainy day funds.[17] Larger shares of revenue from corporate income taxes, more volatile economic environments due to their mix of economic activities, greater dependence on federal aid, reliance on gambling revenues, and larger Medicaid expenditures have a higher score on the volatility index. Joyce then compares the volatility index for each state with the size of the rainy day fund as a percent of the state's budget and categorizes states according to the relationship between the rainy day fund size and the volatility index.

Table 2 below shows the volatility index and the rainy day fund share, for each state. Joyce finds seventeen states that are in "good condition": Alaska, New Mexico, Oklahoma, Idaho, Kentucky,

[14] Cornia, Gary C. and Ray D. Nelson. 2003. "Rainy Day Funds and Value at Risk." *State Tax Notes*, August 25, pp. 563-7.

[15] Joyce, Philip C. 2001. "What's so Magical about Five Percent? "A Nationwide Look at Factors That Influence the Optimal Size of State Rainy Day Funds." *Public Budgeting & Finance*, 21(2), pp. 62-87.

[16] Sjoquist, David L. 1998. "Georgia's Revenue Shortfall Reserve: An Analysis of its Role, Size, and Structure." FRP Report no.5, Andrew Young School of Policy Studies, Georgia State University.

[17] Joyce, Philip C. 2001. "What's so Magical about Five Percent? "A Nationwide Look at Factors That Influence the Optimal Size of State Rainy Day Funds." *Public Budgeting & Finance*, 21(2), pp. 62-87.

Maine, Missouri, South Carolina, Arizona, Florida, Maryland, Minnesota, Mississippi, Nevada, North Carolina, Ohio, and Vermont. (These seventeen states are shaded, in Figure 1 below.)

SPECIFIC STATE ESTIMATES OF ACTUAL AND REQUIRED RAINY DAY FUNDS

Studies have generally found that current rainy day funds are not sufficient to weather a downturn in the business cycle.[18] One reason noted by Joyce is that many states operate under the rule that rainy day funds should be 5 percent of general fund expenditures, though there does not appear to be a clear basis for the rule, and 5 percent may be too low. Still the 5 percent threshold is frequently used today (p.66).

Pollock and Suyderhoud use data from Indiana for the period 1969-1983 and conclude that the rainy day fund needed to be as high as 13 percent in order to avoid a change in state expenditure and revenue patterns.[19] Additionally, they found that withdrawals from the rainy day fund would have been necessary in 31 of 59 quarters.

Sobel and Holcombe calculated the rainy day fund necessary in 1988 to allow each state to survive the downturn that occurred from 1989-1992.[20] On average, they estimate that states should have reserved 30 percent of their 1988 expenditures. The estimates for individual states, however, varied greatly: for some, a rainy day fund less than 5 percent would have been sufficient, while for others, the rainy day fund would need to have exceeded 50 percent.

Navin and Navin estimate the optimal size of a rainy day fund for Ohio for 1985-1995.[21] They find that the required rainy day fund would need to be greater than 13 percent in order to avoid changes in expenditures or tax increases.

Sjoquist (1998) sets up different scenarios related to different possible fiscal goals in order to illustrate the rainy day fund that Georgia would have needed during the recessionary period of 1990-1992.[22] He finds that if the state wanted to maintain the same historic growth in expenditures during the 1990-92 period, the rainy day fund would have needed to be 27.8 percent of FY 1989 net revenues. If Georgia wanted to maintain the historic average annual growth rate during 1990-92, the required rainy day fund would have been 48.9 percent of the FY 1989 net revenues. As one final alternative, he assumes that Georgia needs reserves sufficient to avoid any cut in expenditures due to the recession. In this case, the rainy day fund would need to be 18.5 percent of FY 1989 net revenues. Table 3 illustrates his calculations of the probability that a given reserve level in Georgia would be depleted by a recession. Sjoquist concludes his

[18] The findings are taken from Cornia and Nelson (2003), unless otherwise noted. Cornia, Gary C. and Ray D. Nelson. 2003. "Rainy Day Funds and Value at Risk." *State Tax Notes*, August 25, pp. 563-7.
[19] The findings are taken from Cornia and Nelson (2003), unless otherwise noted. Cornia, Gary C. and Ray D. Nelson. 2003. "Rainy Day Funds and Value at Risk." *State Tax Notes*, August 25.
[20] Sobel, Russell S. and Randall G. Holcombe. 1996. "The Impact of State Rainy Day Funds in Easing State Fiscal Crises During the 1990-1991 Recession." *Public Budgeting & Finance,* 16(3), pp. 28-48.
[21] The findings are taken from Cornia and Nelson (2003), unless otherwise noted. Cornia, Gary C. and Ray D. Nelson. 2003. "Rainy Day Funds and Value at Risk." *State Tax Notes*, August 25.
[22] Sjoquist, David L. 1998. "Georgia's Revenue Shortfall Reserve: An Analysis of its Role, Size, and Structure." FRP Report no.5, Andrew Young School of Policy Studies, Georgia State University.

report by suggesting that Georgia increase the rainy day fund from its current value of 3 percent to 10 to 15 percent of net revenues.

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Sobel and Holcombe (1996) estimated that Tennessee would have needed a rainy day fund equal to 25 percent of the 1988 budget if the state was to have avoided any fiscal stress during the 1989-1992 period, while the rainy day fund needed by the average state in order to avoid tax increases or expenditure cuts was 30 percent. Joyce's results imply that Tennessee needs a relatively large rainy day fund. In FY 1997, Tennessee was the highest spending state on Medicaid, as a share of its budget (Joyce, 2001). The large Medicaid expenditure is one reason that Tennessee's volatility index rated high in comparison to other states. Although Joyce does not recommend optimal sizes of rainy day funds, based on his methodology Tennessee's current rainy day fund is inadequate. In sum, the academic literature estimates adequate rainy day funds at 10-20 percent of states' expenditures, and it appears Tennessee should have a rainy day fund in this range if it is to avoid fiscal stress.

TABLE 2

Comparison of Volatility and Rainy Day Fund Balances, by State

	Volatility Index	Rank	RDF as Percent of Budget	Rank	Rank Difference
North Dakota	13.64	48	0	1	-47
Illinois	12.72	41	0	1	-40
Georgia	11.98	36	0	1	-35
New York	13.13	45	1	16	-29
Kansas	10.44	28	0	1	-27
New Hampshire	16.67	50	2.3	23	-27
Tennessee	**12.98**	**44**	**1.8**	**18**	**-26**
California	12.56	40	0.8	15	-25
Wisconsin	9.92	23	0	1	-22
Oregon	9.88	22	0	1	-21
Nebraska	12.90	43	2.2	22	-21
Alabama	9.24	20	0	1	-19
West Virginia	13.26	46	2.9	29	-17
South Dakota	15.17	49	3.8	32	-17
Louisiana	9.13	17	0	1	-16
New Jersey	11.46	35	2.1	21	-14
Utah	12.52	38	2.4	24	-14
Montana	8.84	13	0	1	-12
Arkansas	8.70	11	0	1	-10
Wyoming	8.49	10	0	1	-9
Pennsylvania	10.17	25	1.3	17	-8
Connecticut	11.37	34	2.6	26	-8
Rhode Island	12.31	37	3	30	-7
Hawaii	8.15	5	0	1	-4
Massachusetts	12.52	39	4.5	36	-3
Texas	7.54	3	0	1	-2
Washington	6.47	1	0	1	0
Virginia	9.15	18	2	20	2
Michigan	13.30	47	14.6	49	2
Colorado	10.32	27	3.9	33	6
North Carolina	10.57	31	4.8	37	6
Iowa	12.81	42	10.4	48	6
Missouri	8.77	12	1.9	19	7
Delaware	11.21	33	5.3	40	7
Indiana	11.12	32	5.9	41	9

Maine	8.91	14	2.5	25	11
Arizona	9.97	24	4.9	38	14
Minnesota	10.55	30	7.2	44	14
Nevada	10.45	29	8.3	47	18
Idaho	8.48	9	2.9	28	19
Mississippi	10.24	26	7.5	45	19
Florida	9.09	15	4.4	35	20
Vermont	9.20	19	4.9	39	20
Maryland	9.39	21	6.6	43	22
South Carolina	7.34	2	2.7	27	25
Kentucky	8.16	6	3.5	31	25
Ohio	9.12	16	6.2	42	26
New Mexico	8.19	7	4.1	34	27
Oklahoma	7.64	4	7.5	46	42
Alaska	8.43	8	130	50	42

Source: Joyce, Philip G. (2001). What's so magical about five percent? A nationwide look at factors that influence the optimal size of state rainy day funds. Public Budgeting & Finance, 62-87.

TABLE 3

Probability That Given Reserve Will Not Offset Recession

Reserve as a Percentage of the Budget	Probability
5 percent	95.8 percent
10 percent	85.4 percent
15 percent	70.8 percent
20 percent	58.3 percent
25 percent	50.0 percent
30 percent	41.7 percent
35 percent	33.3 percent
40 percent	20.8 percent
45 percent	16.7 percent
50 percent	10.4 percent
55 percent	8.3 percent

Source: Sjoquist, David L. 1998. "Georgia's Revenue Shortfall Reserve: An Analysis of its Role, Size, and Structure." FRP Report no.5, Andrew Young School of Policy Studies, Georgia State University.

FIGURE 1

Comparing Rainy Day Fund Balances to Budget Volatility

RDF Balances	Volatility: High > 11% (Total = 19)	Volatility: Medium 9-11% (Total = 17)	Volatility: Low < 9% (Total = 14)
High > 4% (Total = 17)	Delaware, Indiana, Massachusetts, Michigan	Arizona, Florida, Maryland, Minnesota, Mississippi, Nevada, North Carolina, Ohio, Vermont	Alaska, New Mexico, Oklahoma
Medium 1.5-4% (Total = 16)	**Connecticut, New Hampshire, New Jersey, Rhode Island, South Dakota, Tennessee, Utah, West Virginia**	Colorado, Pennsylvania, Virginia	Idaho, Kentucky, Maine, Missouri, South Carolina
Low < 1.5% (Total = 17)	**California, Georgia, Illinois, New York, North Dakota**	**Alabama, Kansas, Louisiana, Oregon, Wisconsin**	**Arkansas, Hawaii, Montana, Texas, Washington, Wyoming**

KEY
Problem state in **bold letters**
Likely adequate balances in shaded boxes

Source: Joyce, Philip G. (2001). What's so magical about five percent? A nationwide look at factors that influence the optimal size of state rainy day funds. Public Budgeting & Finance, 62-87.

Section 3: Results from Simulation Models

SIMULATION ANALYSIS

State governments use rainy day funds to maintain expenditures or allow them to grow with expenditure demands rather than be limited by short run revenue fluctuations. State revenue growth is particularly volatile in recessions, so rainy day funds are normally used to smooth out expenditure patterns during recessions. This section provides the results of simulations intended to determine the rainy day fund that would be necessary for Tennessee to weather various kinds of economic storms. The appropriate rainy day fund at the beginning of a recession depends on two basic characteristics: how revenues will grow (or decline) during the recession and the goal that Tennessee has for expenditures during the recession. The character of recessions is very different as they affect industries and states in very different ways. Also, tax revenues perform differently depending on the specific conditions of the recession. So there is no single answer to the amount of revenues that ought to be in the rainy day fund. Therefore, a series of simulations is developed to provide a range within which the appropriate rainy day fund should fall.

The simulations presented here are based on actual Tennessee experiences during recessions rather than on theoretical scenarios. Specifically, this section evaluates the rainy day funds that would be necessary based on the assumption that revenues perform during the next five years in a similar pattern to Tennessee's actual experience during the recessions of the early 1980's, 1990's, and 2000's. These three time periods provide a good span of possible recessions since the 1980's recession was very severe, the 1990's was mild, and the 2000's recession was between the others in severity.

METHODOLOGY

A total of six simulations is conducted, two for each of the three recessions. The approach is as follows:

Revenue Side

- Begin with 2007 expected revenue as a baseline. The analysis examines the rainy day fund necessary to finance expenditures from Department of Revenue tax collections and not from all Tennessee own source revenues. The rainy day fund could need more funding to account for volatility in other revenues, such as Treasurer's receipts. For this purpose we use $10,849.3 million.
- Determine the natural revenue growth during recessions by extracting the effects of any tax rate increases that affected revenue growth during the previous recessions.
- In separate simulations, assume that revenues grow (or decline) from 2008 to 2012 according to the natural revenue growth rate that occurred around the 1980 recession, 1990 recession, and 2000 recession. Specifically, 2007 is paralleled to 1979, 1989, and 1999 in the three simulations. Revenue growth in the following years is assumed to occur at the same real (inflation adjusted) rate as the actual experience during the corresponding years of each recession. Then, expected inflation for 2008 to 2012 is included so that the revenues are in nominal (current dollar) terms.
- The result is a pattern of revenues that correspond to the expected growth (or decline) that would result if a similar recession similar to these three were to occur.

Expenditure Side

- Begin by assuming a balanced budget in 2007, so that expenditures equal revenues.
- Create simulations based on two different goals that Tennessee state government might adopt to undertake frugal spending during recessions. First, estimate the spending levels that would occur if expenditures grew the same as actually occurred during each of the three recessions (again, based on the real expenditure growth rates and adding in expected inflation). Thus, allow spending to reflect the actual experience of Tennessee government during the recessions. Second, assume that Tennessee state government expenditures grow at one-half the rate of the actual growth of the past decade (1998 through 2007), or 3.1 percent annually. Thus, the assumption is that relative cutbacks are made in spending growth, but dollars of expenditures continue to rise.

Rainy Day Fund

- The rainy day fund is calculated by determining the amount of funding in addition to tax collections that is necessary to allow the expenditure goals to be achieved. Thus, the rainy day fund is equal to the estimated shortfall, or expenditures minus revenues. The rainy day fund is cumulated across the years from 2008 through 2012, so the necessary amount generally grows across the recession.

SIMULATION RESULTS

The simulation results are reported in Tables 1-3 and are illustrated in Figures 1-3.

Mild Recession (1990s-style recession)

The 1990s recession illustrates the effects of a mild recession (see Table 4 and Figure 2). Row 1 shows the expected revenue growth. Only one year of negative revenue growth would be expected versus two or three years with the other recessions. Revenues would grow at a compound annual 4.0 percent rate across the five years, which, though slower than the long-term average in Tennessee, is much better than the other recession scenarios. Expenditure growth was relatively robust during these five years because of the 1992 sales tax rate increase and phasing in of the BEP that occurred during the early 1990's (row 2). Growth at half of the actual experience of the past 9 years provides the more conservative view of spending increases for this recession (row 5). The rainy day fund would need to be $1,254.3 million even to maintain the more conservative increase in spending (row 7). Specifically, $104.9 million would be needed in 2008, another $600.8 million in 2009 and so forth until a total of $1,254.3 million was required by 2011. A total of $544.8 million of the rainy day fund could be replaced in 2012. A much greater rainy day fund would be necessary if a more aggressive goal was adopted on the expenditure side (see line 4)

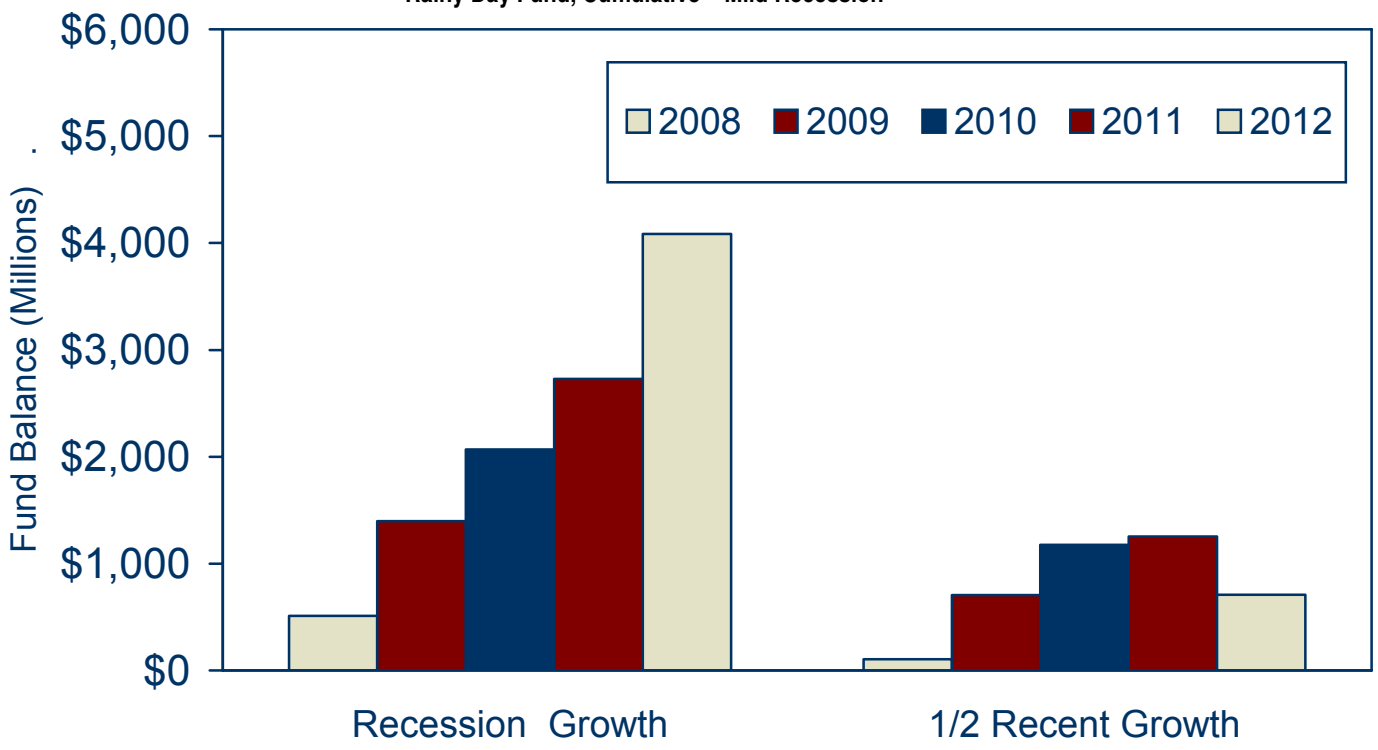
TABLE 4

Rainy Day Fund – Mild Recession

	2007	2008	2009	2010	2011	2012
Revenues (mil$)	**$10,849.3**	**$11,080.3**	**$10,930.7**	**$11,417.7**	**$12,178.7**	**$13,180.8**
Recession Expenditures (mil$)	**$10,849.3**	**$11,592.6**	**$11,815.3**	**$12,087.6**	**$12,841.6**	**$14,534.8**
Rainy Day Fund, annual (mil$)		$512.3	$884.6	$669.9	$662.9	$1,354.0
Rainy Day Fund, cumulative (mil$)		$512.3	$1,396.9	$2,066.8	$2,729.8	$4,083.8
1/2 Recent Growth Expenditures (mil$)	**$10,849.3**	**$11,185.2**	**$11,531.5**	**$11,888.5**	**$12,256.5**	**$12,636.0**
Rainy Day Fund, annual (mil$)		$104.9	$600.8	$470.8	$77.8	$(544.8)
Rainy Day Fund, cumulative (mil$)		$104.9	$705.7	$1,176.5	$1,254.3	$709.5

FIGURE 2

Rainy Day Fund, Cumulative – Mild Recession



Average Recession (2000s-style recession)

The 2000s recession can be thought of as an average experience, though these years were a time when tax revenue growth was particularly low (see Table 5 and Figure 3). Revenues would rise a compound annual 1.8 percent (which is lower than inflation) and there would be three years of actual revenue declines. Based on the actual expenditure growth pattern, spending would rise 4.3 percent annually (line 2), so one-half of the actual experience of the past decade is the more conservative approach (line 5). Interestingly, revenues grew fast enough in the first year of the revenue slowdown so that the rainy day fund would be increased by $272.8 million in 2008. Then, $85.4 million would be needed in 2009 and so forth until the rainy day fund would need to be $2.2 billion to allow spending to grow half as fast as the recent experience. Again, a much larger rainy day fund would be necessary if a more aggressive expenditure goal was adopted.

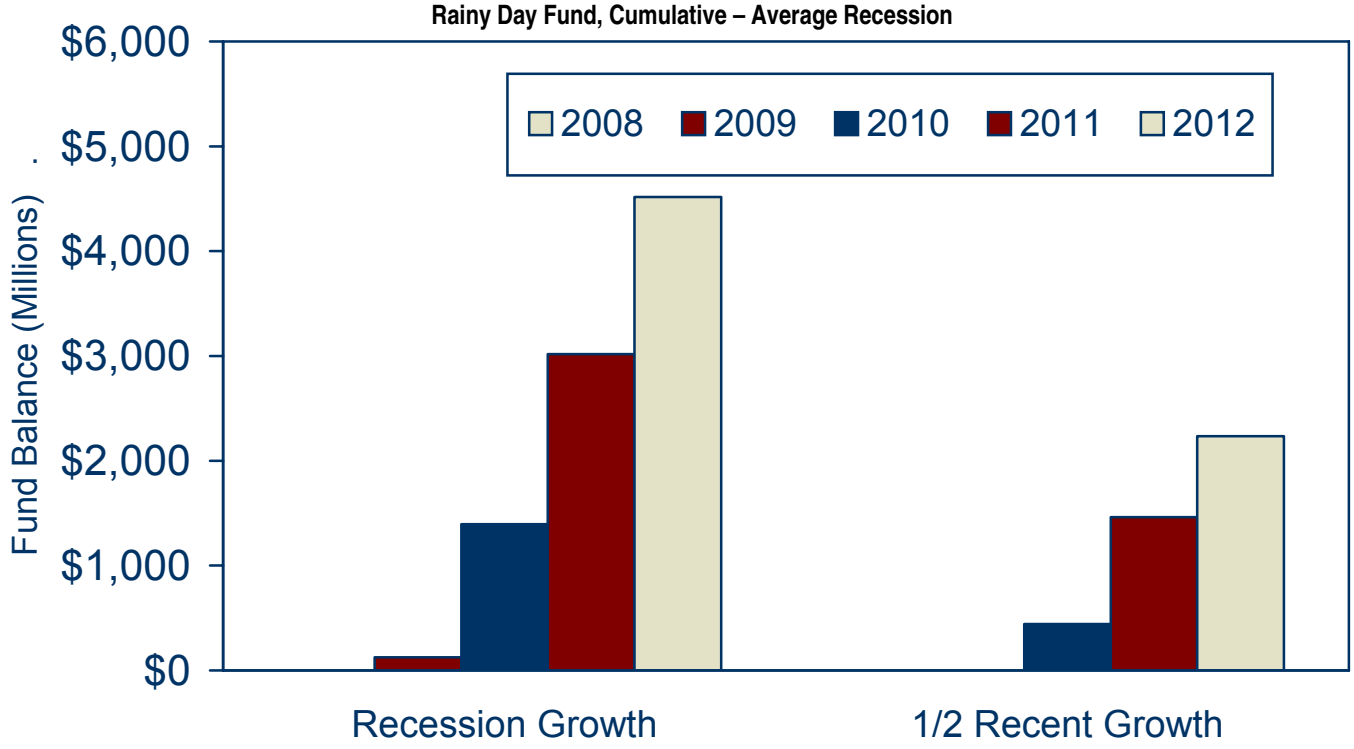
TABLE 5

Rainy Day Fund - Average Recession

	2007	2008	2009	2010	2011	2012
Revenues (mil$)	**$10,849.3**	**$11,458.0**	**$11,446.1**	**$11,257.5**	**$11,238.3**	**$11,863.3**
Recession Expenditures (mil$)	**$10,849.3**	**$11,172.1**	**$11,856.9**	**$12,528.8**	**$12,859.8**	**$13,362.5**
Rainy Day Fund, annual (mil$)		$(285.9)	$410.8	$1,271.3	$1,621.5	$1,499.1
Rainy Day Fund -- cumulative (mil$)		$(285.9)	$124.9	$1,396.2	$3,017.7	$4,516.9
1/2 Recent Growth Expenditures (mil$)	**$10,849.3**	**$11,185.2**	**$11,531.5**	**$11,888.5**	**$12,256.5**	**$12,636.0**
Rainy Day Fund, annual (mil$)		$(272.8)	$85.4	$631.0	$1,018.2	$772.7
Rainy Day Fund, cumulative (mil$)		$(272.8)	$(187.4)	$443.6	$1,461.8	$2,234.5

FIGURE 3

Rainy Day Fund, Cumulative – Average Recession



Severe Recession (1980s-style recession)

The 1980s data evidence the rainy day fund that is necessary to withstand a severe recession (Table 6 and Figure 4). As expected, the rainy day fund would need to be greatest with a severe recession. Row 1 evidences that revenues would be expected to decline significantly in the first two years of the recession and to not fully recover over the five-year window through 2012. Expenditures would be expected to rise slightly, though at a compound annual rate of less than 0.3 percent, if they were to follow the pattern of actual spending during the early 1980's. This evidences that state government was very conservative in its spending behavior during this severe recession, by dramatically lowering expenditure growth. Achieving similar cutbacks in the current era could be more difficult because of the importance of health care costs to total state budgets. Still, a rainy day fund of more than $800 million would be necessary in the first year alone, and the cumulative total would be $2,039.7 million even with this very conservative expenditure goal.

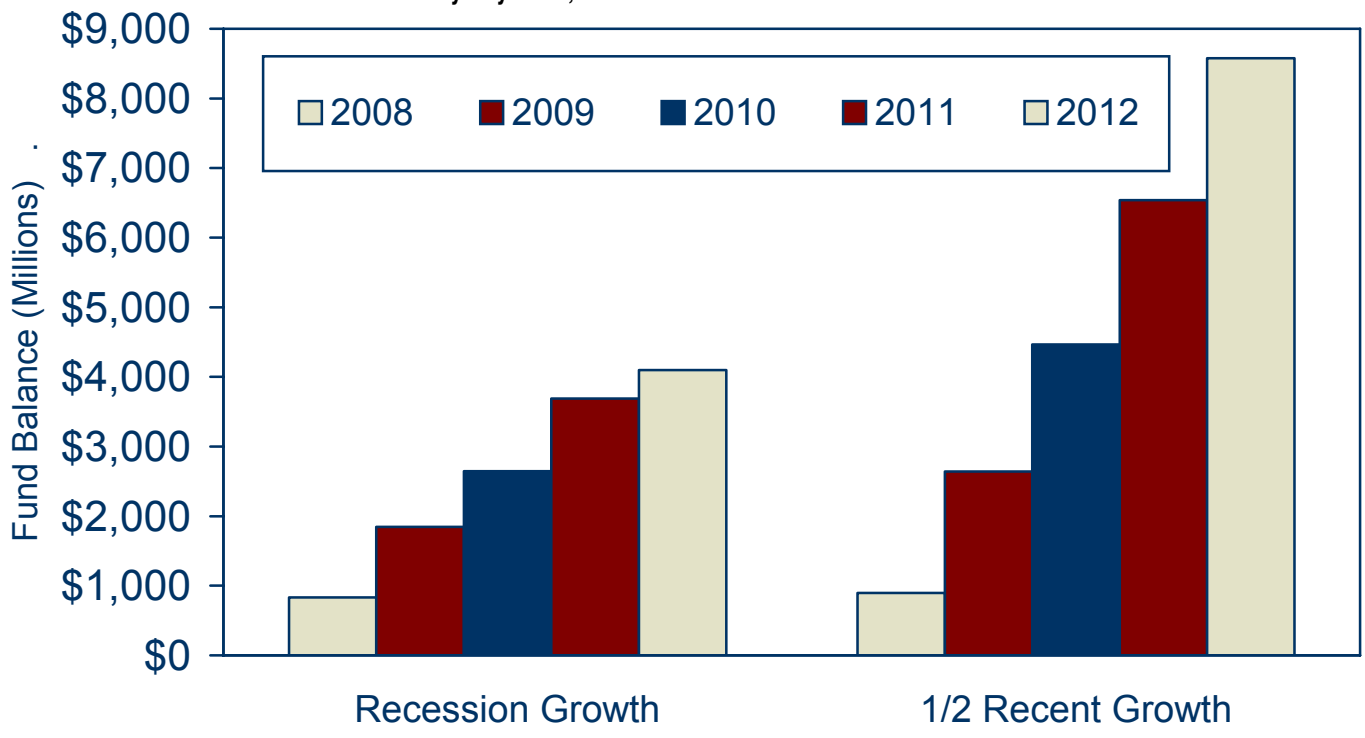
TABLE 6

Rainy Day Fund – Severe Recession

	2007	2008	2009	2010	2011	2012
Revenues (mil$)	$10,849.3	$10,287.9	$9,786.2	$10,063.5	$10,187.2	$10,596.3
Recession Expenditures (mil$)	$10,849.3	$11,120.9	$10,799.2	$10,862.8	$11,231.4	$11,004.7
Rainy Day Fund, annual (mil$)		$833.0	$1,013.0	$799.4	$1,044.2	$408.4
Rainy Day Fund -- cumulative (mil$)		$ 833.0	$1,846.1	$2,645.4	$3,689.6	$4,098.1
1/2 Recent Growth Expenditures (mil$)	$10,849.3	$11,185.2	$11,531.5	$11,888.5	$12,256.5	$12,636.0
Rainy Day Fund, annual (mil$)		$897.3	$1,745.3	$1,825.0	$2,069.3	$2,039.7
Rainy Day Fund, cumulative (mil$)		$897.3	$2,642.5	$4,467.5	$6,536.9	$8,576.6

FIGURE 4

Rainy Day Fund, Cumulative – Severe Recession



IMPLICATIONS AND CONCLUSIONS FOR TENNESSEE

The simulations evidence that a rainy day fund of more than $1 billion, or at least 11 percent of current revenues, is needed to withstand even a modest recession with a relatively conservative spending goal. A rainy day fund of this magnitude would be large based on past Tennessee experience, but the rainy day fund is modest when seen in the light of the total revenues collected during the five years for which the revenues might be used. For example, the $1.3 billion rainy day fund needed in the mildest scenario is only about 2 percent of total revenues collected during this time period. A rainy day fund as high as 40 percent or more of 2007 revenues would be necessary to prepare for the most severe recessions and less restrictive expenditure goals.

Historically, Tennessee has raised tax rates during recessions. Tax rate increases allow the necessary rainy day fund to be reduced significantly, though the point of a rainy day fund is to avoid rate increases. But, a rate increase that generated $200 million in the first year of the slowdown would collect $1 billion during the five years and allow the rainy day fund to be decreased accordingly.

Conclusion

This report has examined rainy day funds from three different perspectives: the rating agencies, academics and simulation analysis using the actual experience of Tennessee during the past three recessions. The varying perspectives and approaches suggest some differences in the appropriate rainy day fund. A balance of 5 percent of expenditures is the lowest recommendation of any approach considered in this report. The 5 percent balance is recommended by some rating agencies, but this percentage appears to be based on assertions made without any strong analysis or study of actual experiences. Further, Fitch has noted that a rainy day fund of 10 percent or more is viewed more favorably. The rating agencies are not consistently clear on the base that should be used to calculate the rainy day fund. The rainy day fund expectations are greater to the extent that the rating agencies are using an expansive definition of the base.

Academic studies and simulation analyses based on Tennessee's previous experiences during recessions indicate that much larger balances should be built during good revenue growth periods. For example, the simulation analysis finds that a balance of at least 11 percent of expenditures is appropriate to prepare for a mild recession when the state has modest expectations on the expenditures that it wants to maintain. Much greater balances should be built if the plan is to prepare for significantly stronger recessions. The academic analysis confirms that large rainy day funds would generally be the best strategy for other states as well. The academic studies indicate that larger rainy day funds should be built in states that have the most volatile revenue structures or that have relatively large expenditures on cyclical categories such as Medicaid. These conclusions suggest that Tennessee should expect to maintain an above average rainy day fund relative to other states because of our particular expenditure and tax structures.

In summary, Tennessee should plan to establish a rainy day fund balance of at least 10 percent of own source revenues, and an even larger balance would be preferred. Such a percentage is very modest when it is recognized that periods of slow revenue growth tend to span three to five years, so that the rainy day fund would only represent about two percent of the revenue collected during the slowdown. A balance of this size would impose fiscal discipline upon the state and allow the state to maintain minimal expenditure growth during economic downturns. The state should also expect to impose careful expenditure restraint during weak revenue growth periods. But, Tennessee must recognize that expenditures for many items, such as health care and fuel, are largely outside of the state's control and the potential for some expenditure increases must be anticipated. The recommendation provided here calls for prudent planning and saving by Tennessee because economic cycles are a reality and are often not easily anticipated well in advance. Of course, rainy day fund balances can also be invested wisely by the state and the earnings can be an important revenue source for financing required service expenditures.